I have major problems with this assessment.

The blind assumption that achieving "Carbon zero" by 2050 is achievable in the real world. As you may know, the Interim committee on climate change produced an excellent report that strongly recommend that the objective be abandoned as being hugely expensive and impractical and replaced by 95% renewables. Why has this sound advice being ignored?

The expectation that sales of electric cars will continue to increase as predicted ignores recent real world evidence that they are falling out of favour with customers. Sales are nowhere near what was predicted and, in many cases, are declining. The assumption that ordinary motorists will be able and willing to connect their car to the system and have the battery discharged to stabilise the power system. This will reduce battery life and, according to my calculations, means that they would need to be rewarded by more than $.10/kWh. This makes it very expensive as a source of stabilising power. More importantly Gavin want to risk discovering that they have a flat battery in the morning because the system was in a crisis state.

The problem of providing sufficient low-cost long-term storage to compensate for the fluctuations in wind and solar power and dry years seems to have been totally ignored.

Yet without storage sufficient to keep the lights on over a four day in war "wind drought", there could be a major blackout for days on end. To my knowledge there is new technology available on the horizon that can provide the necessary storage at an acceptable price.

The attachment below gives an Australian estimate of the cost of storage. As you can see, battery storage is enormously expensive to purchase, has a life of maybe 2000 cycles and a cost of more than 15¢/kWh for electricity stored. Yet the Electricity Authority and others in New Zealand seem to believe that it is a solution. They need to get up to date with the latest information. All over the world there is convincing evidence that the more wind and solar power on a system the more expensive the electricity. Claims that they are cheap are based on the cost at the power station gate and ignore the enormous cost of providing storage when the sun isn't shining and the wind is blowing. When this is factored in, wind and solar are seriously expensive.

The only practical way of managing wind droughts and dry years is storing gas and coal. Yet this is not mentioned in the document. The Electricity Authority should be warning the government that without an adequate supply of gas and/or coal to get us through winter droughts and dry years, the system will be at risk. It does not appear to be doing so.

The electricity account authority should also bear in mind, that absent government subsidies and mandates, electric cars, windfarms and solar farms would not exist.

The project should be abandoned and replaced by one that deals with real problems in the real world.

Kind regards,

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WIND DROUGHTS IN A RENEWABLE ONLY SYSTEM

Wind Droughts

The amount of storage required is unknown and estimates vary.

If a wind drought were to last 2 days – a not unusual event - in a wind-only system with demand at 330,000 GWh (current levels increased by a quarter because of EVs and other energy changes) this means an average daily use of 900 MWh. Storage needed would be 1,800 GWh. But this would assume that the replenishment would be immediate. A mixed system of wind and solar would require less storage because the *dunkelflaute* effects would be modified by the solar output but wind is a cheaper source of electricity.

Estimates of Costs of Storage

Battery	Storage (MWh)	Cost	Cost/MWh
Greenbank battery	400	325,300,000	813,250
Stanwell battery	300	269,100,000	897,000
Borumba	48,000	14,200,000,000	295,833
Snowy 2.0	325,000	10,000,000,000	30,769

Source Qld State budget, Graham Young

Aggregate Storage Installation Costs

Taking into effect realistic replenishment trajectories, no losses in the transport to and from storage and assuming a perfect operating system of limitless transmission, and no growth in current demand, Global Roam's Paul McArdle estimated the need at 9,000 GWh which is 70,000 Hornsdale batteries or 25 Snowy 2's or $6.3 trillion. That is more than twice the nation's GDP for a system that would also be prone to a great deal more breakdowns than has been experienced under the present coal dominant supply.

Francis Menton estimates that 26 days storage is required for a wind only system. For Australia, this means 13,000 gigawatt hours of storage, which is 25 times what the AEMO Integrated Systems Plan envisages. A study by Boston and Bongers put the storage requirements of a 50/50 wind and solar at 3,300 GWh ($2.3 trillion) for a 4-day wind drought.